

PFA oltre l'ablazione della fibrillazione atriale : valutazione dell'impatto di un catetere lineare bipolare

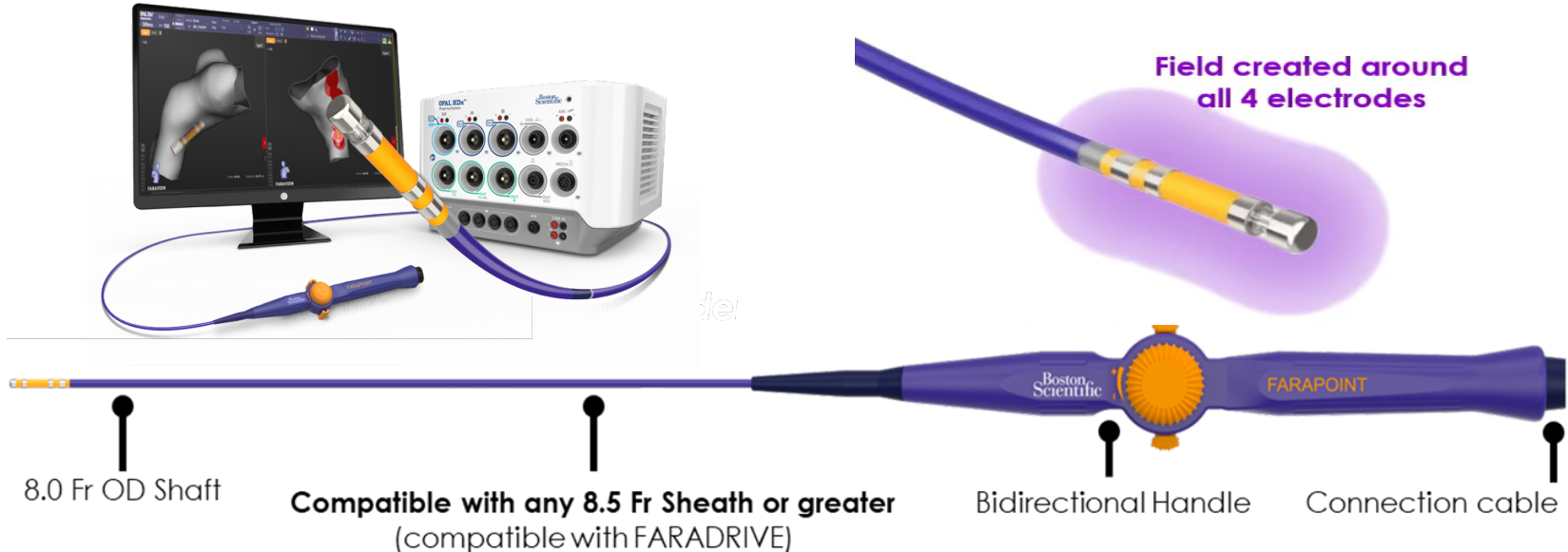
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UOC Cardiologia Ospedale SS Trinità
ASL 8 Cagliari



FARAPOINT

Anticipated Future Ecosystem of Pulsed Field Ablation

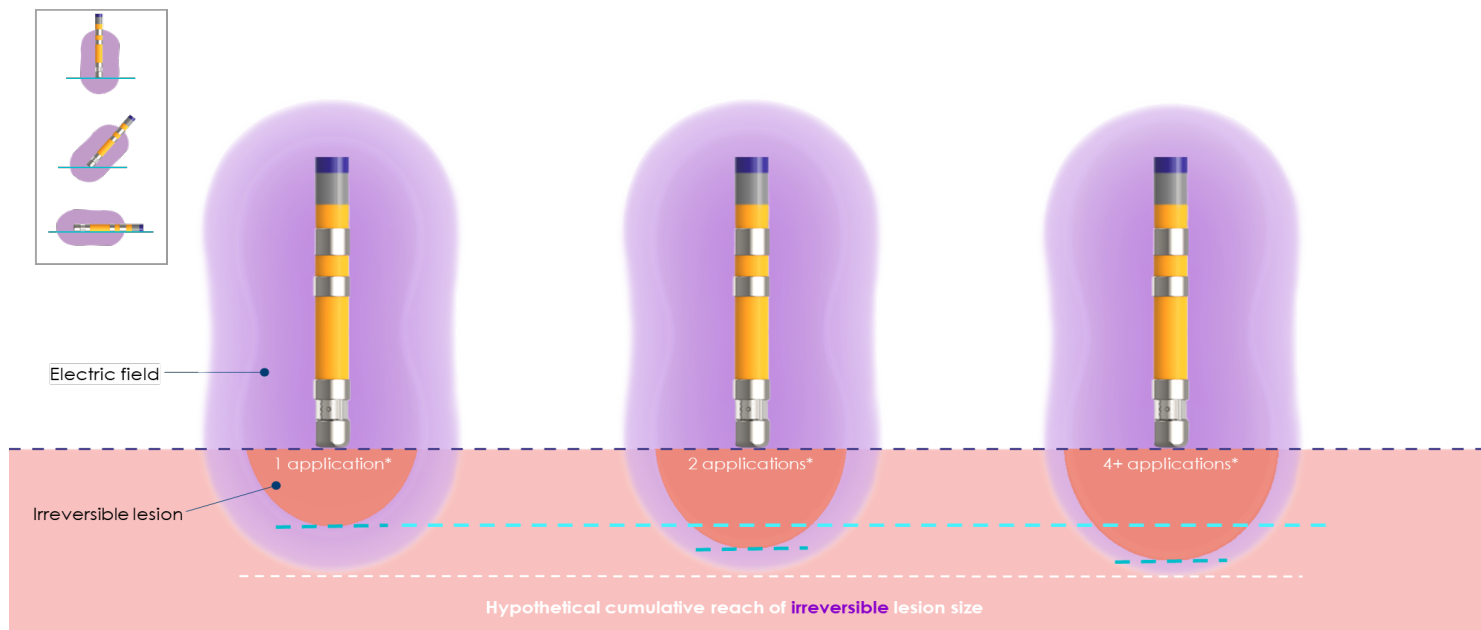
FARAPOINT™ is a nav-enabled PFA catheter built on the FARAPULSE™ Platform that can create FOCAL AND LINEAR-SHAPED LESIONS, visualized on the FARAVIEW™ software



Focal or Linear Ablation based on catheter orientation

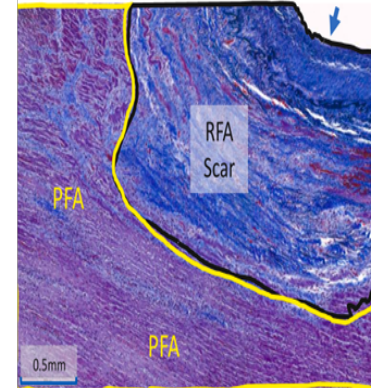
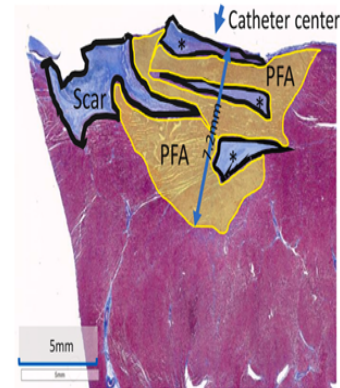
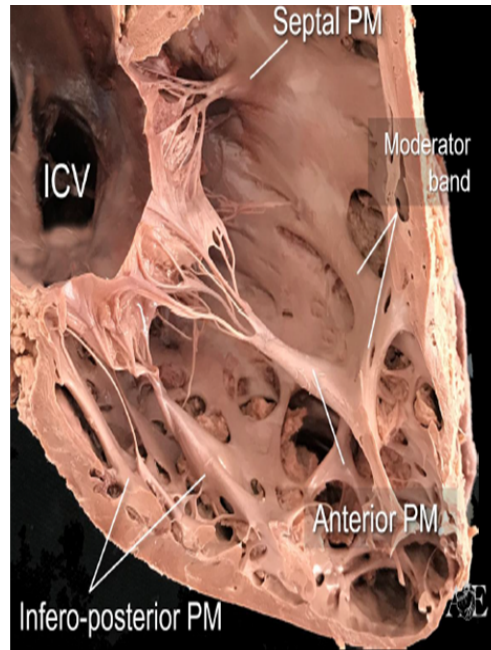
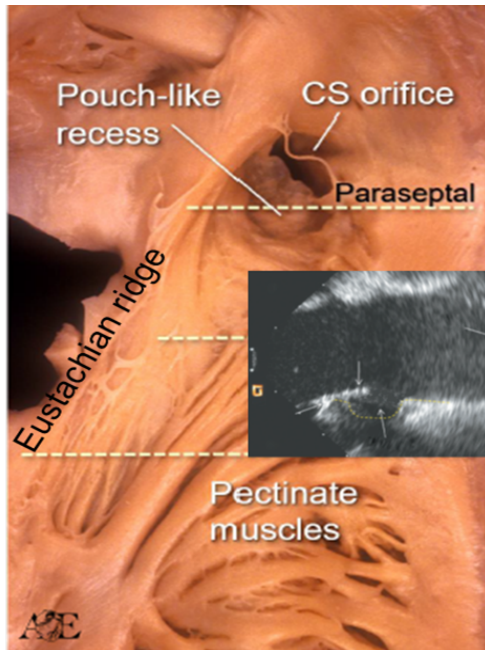
Average of 4.5 mm depth at 2 kV
with **2 application** per site

Increased depth of **7.1 mm at 2 kV**
with **4 application** per site



A PARADIGM CHANGE IN LESION FORMATION: **REPRODUCIBLE LESION**

PFA DOES NOT DEPEND ON ANATOMICAL VARIATIONS:
PROXIMITY TO TISSUE IS CRUCIAL



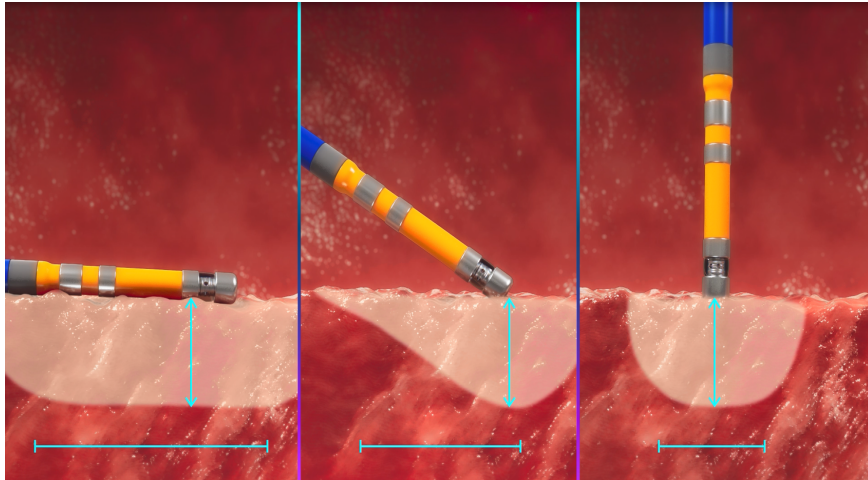
PFA IS LESS SENSITIVE TO THE NATURE OF
ATRIAL AND VENTRICULAR SUBSTRATES

FARAPOINT: Lesion Depth

Lesion Flexibility: Focal or Linear Ablation based on catheter orientation

LESION FLEXIBILITY:

Preclinical Data demonstrated **similar depth regardless of tip orientation**
with a **lesion width has angular dependence**



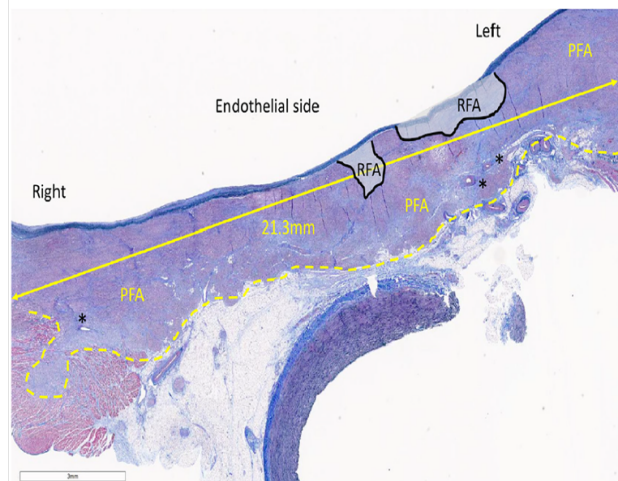
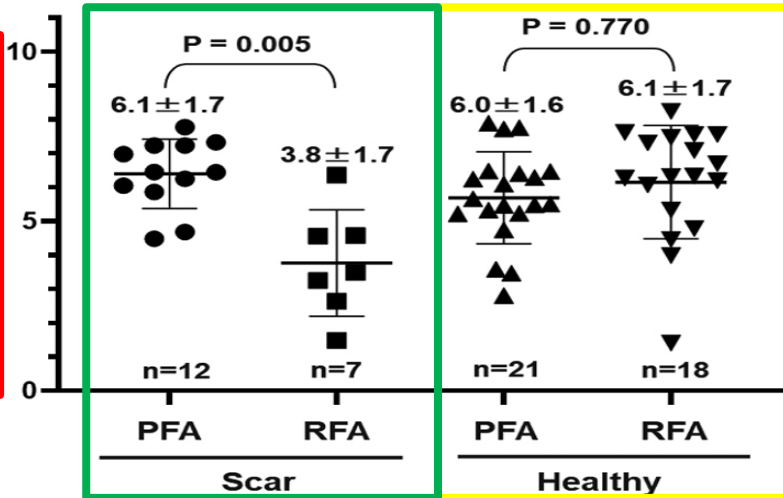
FARAPPOINT VENTRICULAR LESIONS IN RF SCAR

Pulsed Field Ablation of Left Ventricular Myocardium in a Swine Infarct Model

Editorial Comment: Are We Ready for the Next Frontier

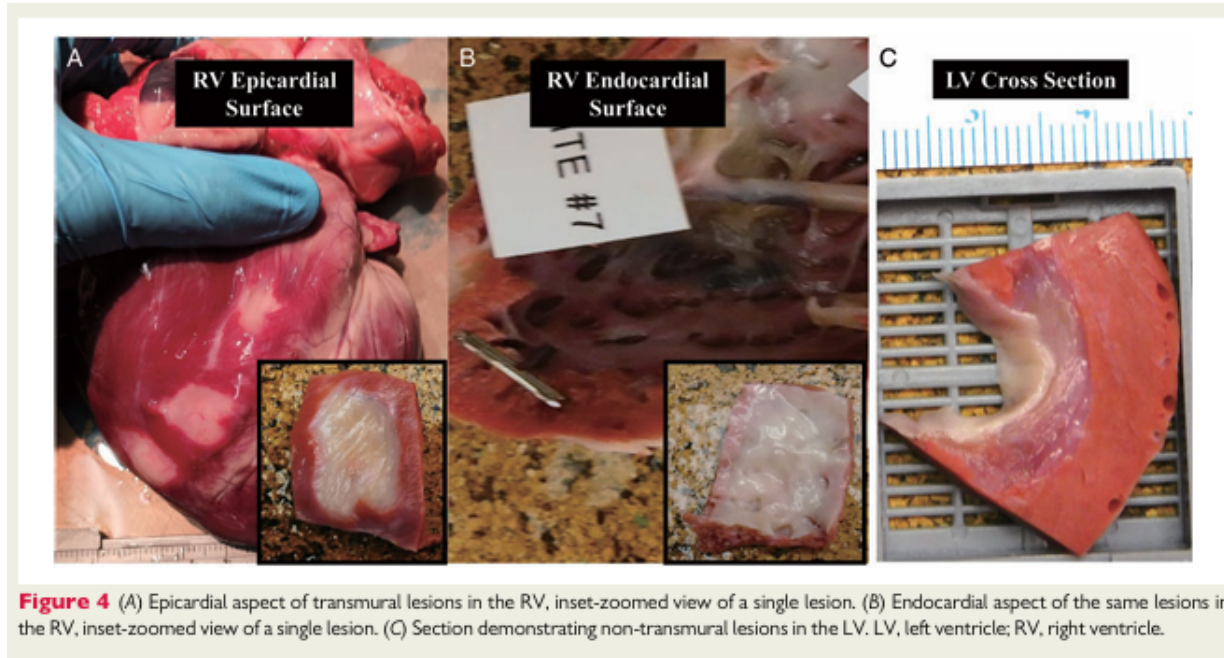
Authors: Sung Il Im, Satoshi Higuchi, Adam Lee, Carol Stillson, Eric Buck, Blake Morrow, Kit Schneider, Molly Speltz, and Edward

Histologic maximal lesion depth (mm)



PFA LESION HOMOGENISED THE PREVIOUS CHRONIC RF LESIONS AND PENETRATED SCAR TISSUE MORE EFFECTIVELY THAN RFA

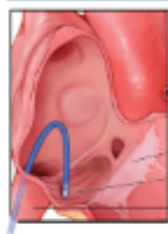
Gross measurements, available for 28 of 30 ablation sites, revealed average lesion dimensions to be 6.5 ± 1.7 mm deep by 22.6 ± 4.1 mm wide, with a maximum depth and width of 9.4 mm and 28.6 mm, respectively.



Koruth JS, Kuroki K, Iwasawa J, Viswanathan R, Brose R, Buck ED, Donskoy E, Dukkipati SR, Reddy VY. Endocardial ventricular pulsed field ablation: a proof-of-concept preclinical evaluation. *Europace*. 2020 Mar 1;22(3):434-439. doi: 10.1093/europace/euz341. PMID: 31876913; PMCID: PMC7058968.

CENTRAL ILLUSTRATION: Cavotricuspid Isthmus Ablation With Pulsed Field Energy Is Effective, Safe, and More Efficient Than Radiofrequency Energy

Comparison of Cavotricuspid Isthmus Ablation With Linear Pulsed Field vs Radiofrequency Energy



- ADVANTAGE AF demonstrated the feasibility of pulsed field ablation for treating persistent AF
- This substudy compared radiofrequency (Phase 1) vs a linear pulsed field catheter (Phase 2) for the additional ablation of right atrial flutter

Phase 1
Radiofrequency
(35-50W)
n = 50

Phase 2
Pulsed Field
(2kV biphasic, bipolar)
Pretreatment: IV NTG
n = 141

Results, Implications and Future Directions

Phase 1
Radiofrequency (RF)

Efficacy: 98.0%
Safety (SAE): 2.0%
Coronary artery
Spasm: 0.0%

Phase 2
Pulsed Field (PF)

Efficacy: 97.9%
Safety (SAE): 2.1%
Coronary artery
Spasm: 0.0%

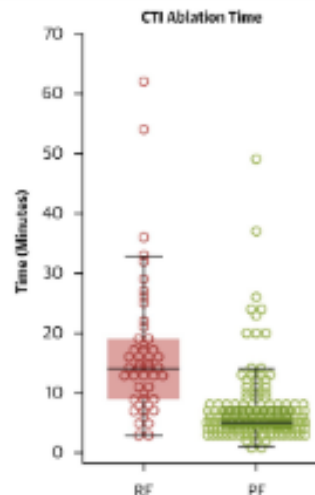
Efficacy: freedom from documented recurrence of typical AFL as of 360 days, without repeat CTI ablation

Clinical Implications:

- Comparable acute CTI block rates with PFA and RFA
- Shorter CTI ablation time with linear PFA
- No clinical manifestations of coronary artery spasm with NTG pretreatment

Future Directions:

- Determine feasibility of performing isolated PFA CTI ablation under conscious sedation
- Studies of coronary angiography late after PFA CTI ablation
- Long-term data studying efficacy and safety



One of the main reasons for ablation failure is an intramural or mid-myocardial location of the arrhythmogenic substrate

- This is particularly common in patients with nonischemic cardiomyopathy,
- It can also be found in ischemic heart disease :critical isthmus may involve the interventricular septum in 22%, and in 11% of these, the critical component is intramural.
- 8% of idiopathic VAs and up to 20% of left ventricular outflow tract (LVOT) VAs may originate from intramural foci.

Ablation strategies for intramural ventricular arrhythmias
Neira, Victor et al.
Heart Rhythm, Volume 17, Issue 7, 1176 - 1184

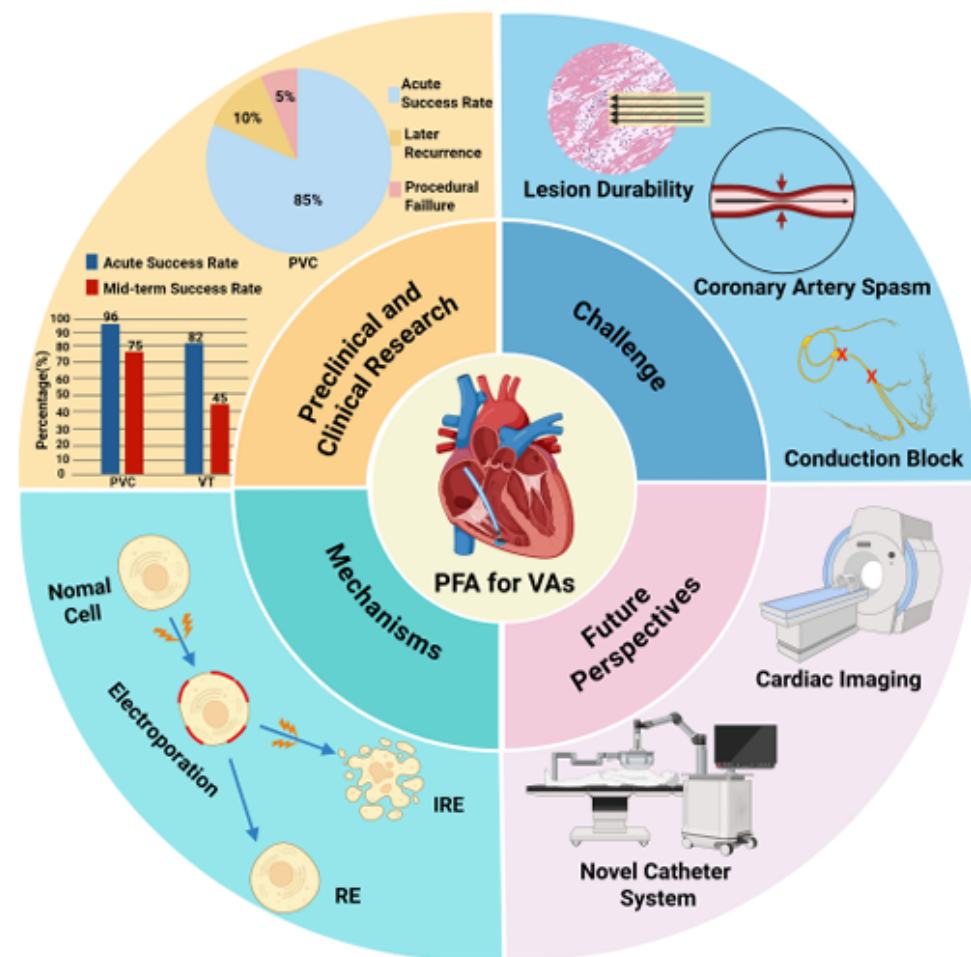


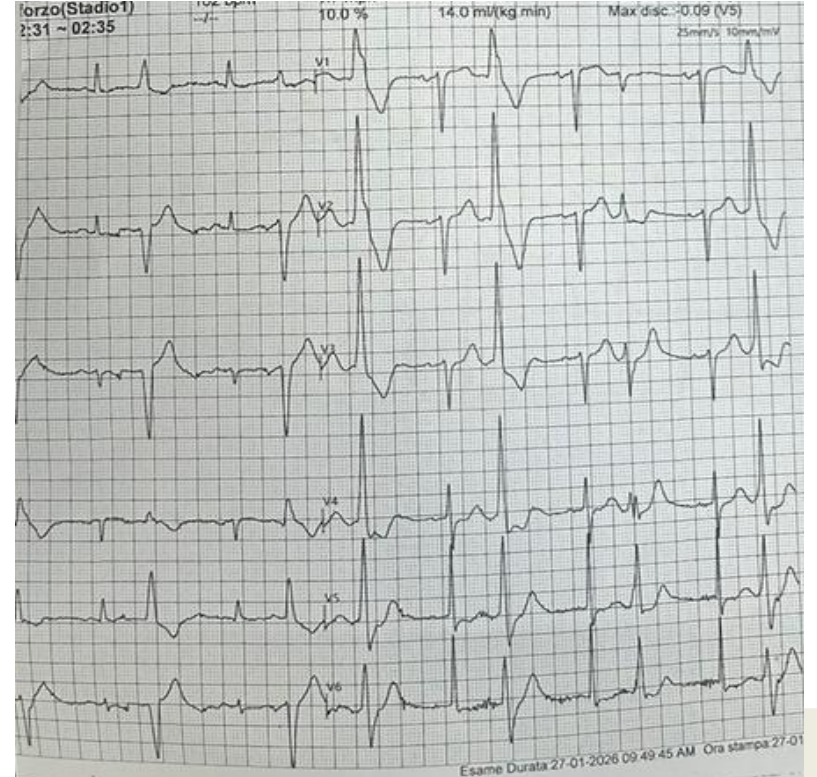
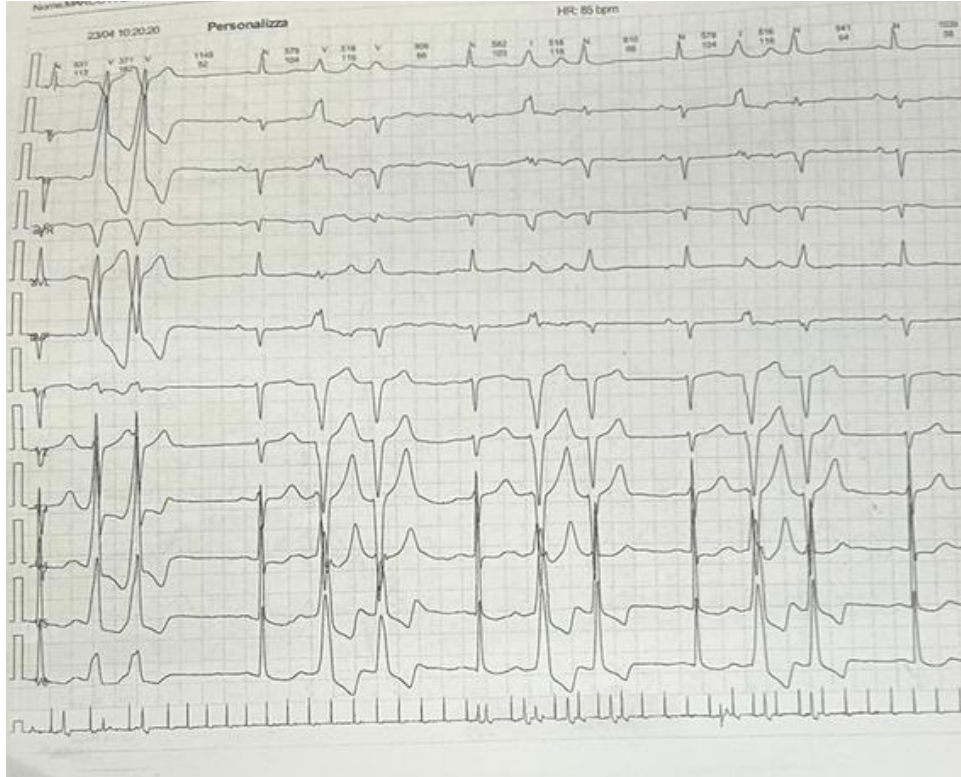
Figure 1 Graphical illustration of PFA for VAs. IRE = irreversible electroporation; PFA = pulsed field ablation; PVC = premature ventricular contraction; RE = reversible electroporation; VA = ventricular arrhythmia; VT = ventricular tachycardia.

Caso clinico N1

- Male 70 yo
- Arterial hypertension
- Hypercholesterolemia (reported intolerance to rosuvastatin due to myalgia)
- Carotid atherosclerosis (non-stenotic lesions)
- Since 2022, diagnosis of exercise-induced ventricular ectopic arrhythmia on ergometric testing, initially treated with bisoprolol (discontinued due to marked bradycardia), then with amiodarone
- In 2025, **amiodarone-induced thyrotoxicosis**, effectively treated with methimazole and corticosteroid
- Echocardiogram (May 2025): EF 60%, hypokinesia of the basal inferior septum and inferior wall, mild-to-moderate aortic stenosis-insufficiency
- Coronary CT (May 2025): IVA1 non-calcified 50% stenosis, partial intramyocardial course of the mid LAD (15 mm)
- **Cardiac MRI (November 2025): mild left ventricular dilation with normal mass, maximum septal thickness 12 mm, trabeculated appearance of the lateral apex, normal wall motion. Flow acceleration at the aortic valve. Thin intramyocardial LGE streak at the proximal septum**
- Ergometric test (January 2026): maximal, negative for angina, ST depression in V5 during exercise. Throughout the test, frequent VEBs, VEB morphology with LBBB axis.

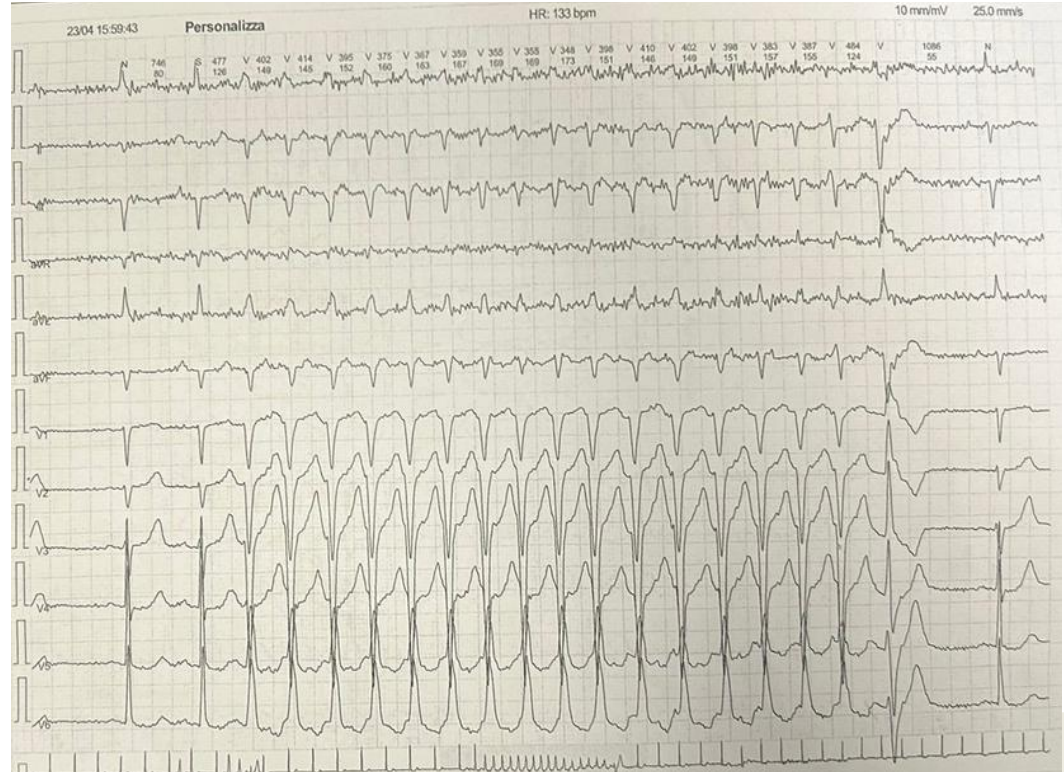
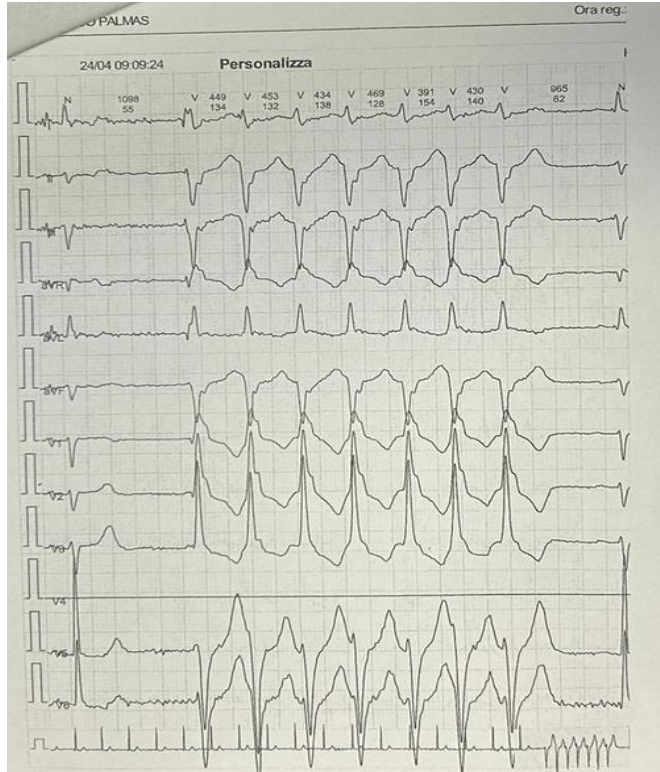
ANAMNESI

ECG PRE ABLAZIONE: PVCs POLIMORFI E NSVTs



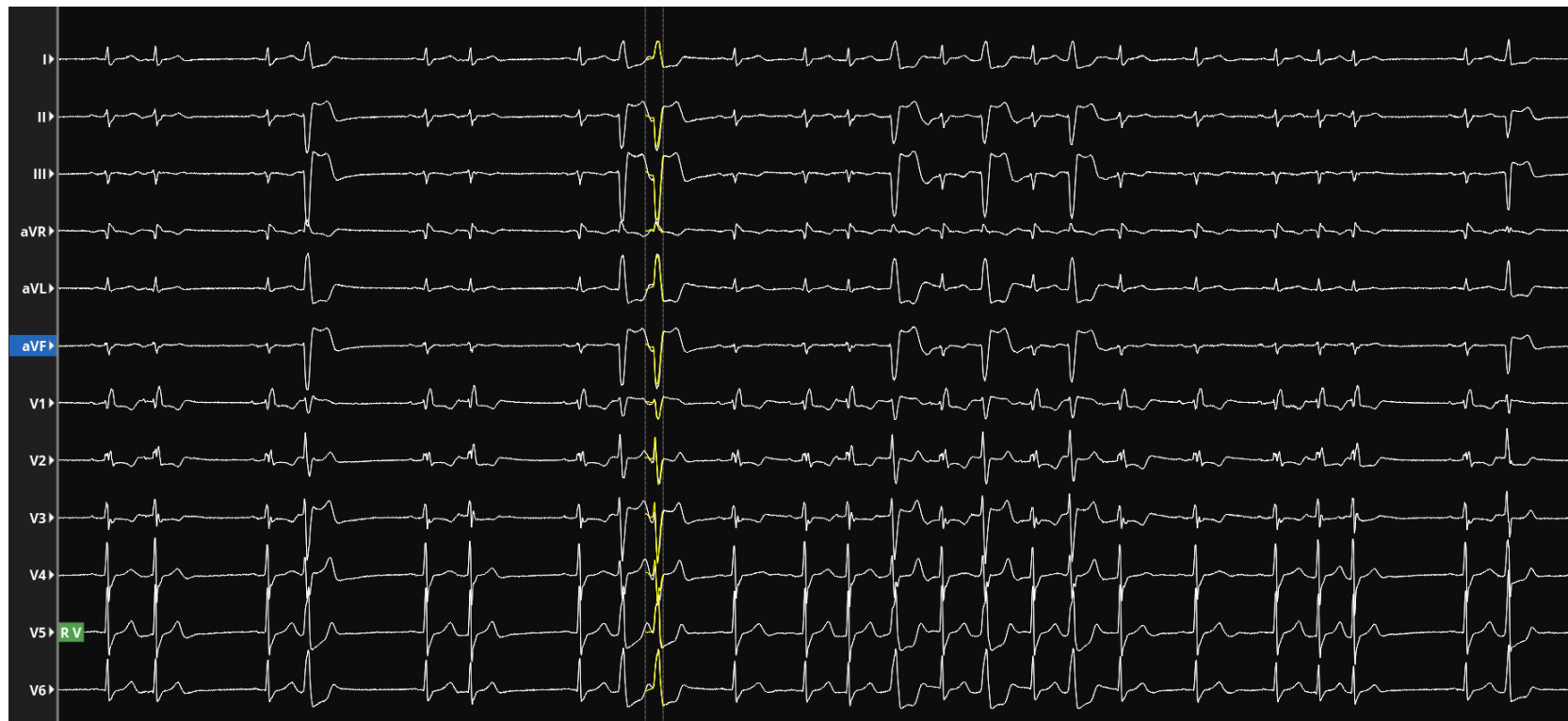
ANAMNESI

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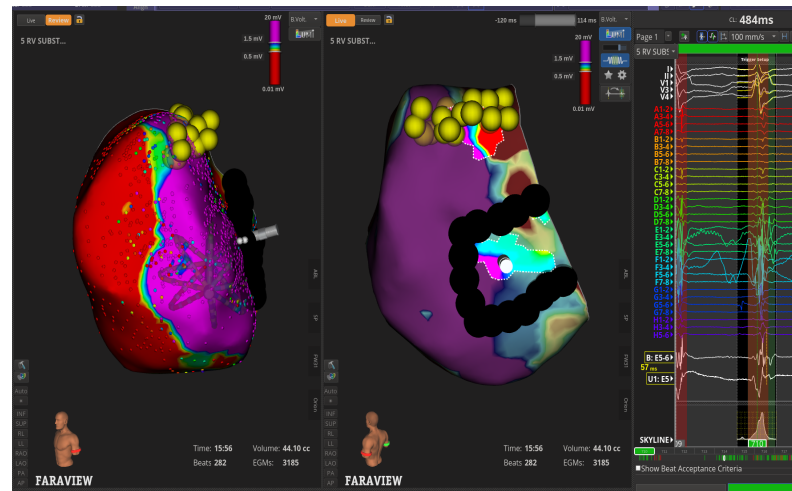
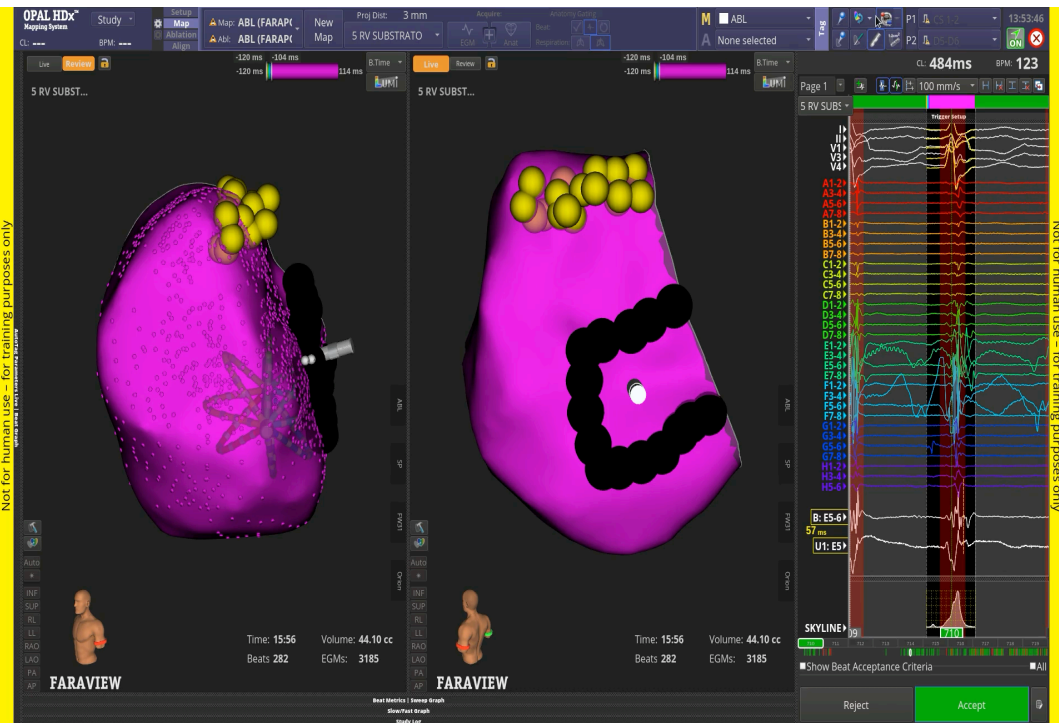
MONITORAGGIO PAZIENTE

INGRESSO PAZIENTE IN SALA



MAPPAGGIO ORION

MAPPA DI SUBSTRATO IN SINUSALE



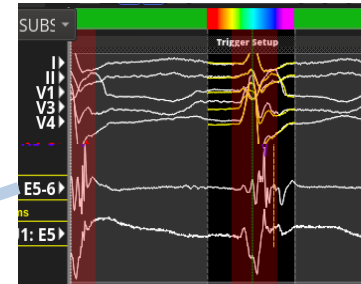
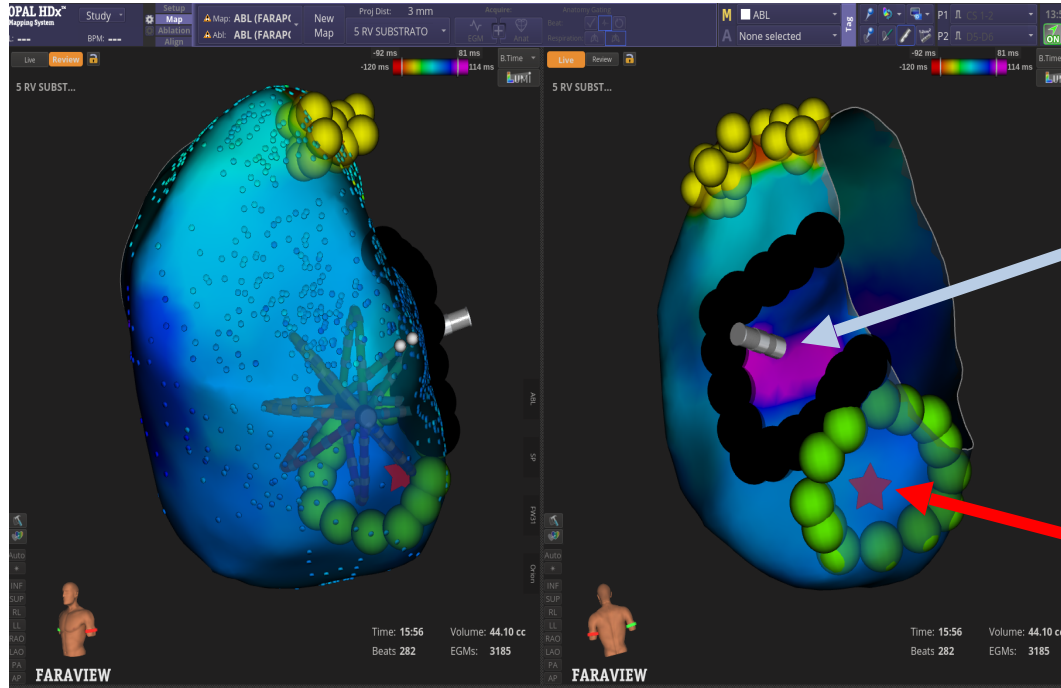
MAPPAGGIO ORION

MAPPAGGIO PVC

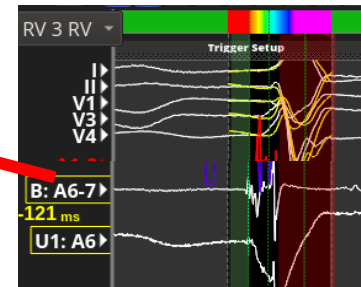


MAPPAGGIO ORION

DUE SUBSTRATI VENTRICOLARI DA ABLARE



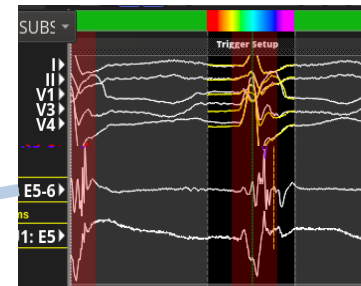
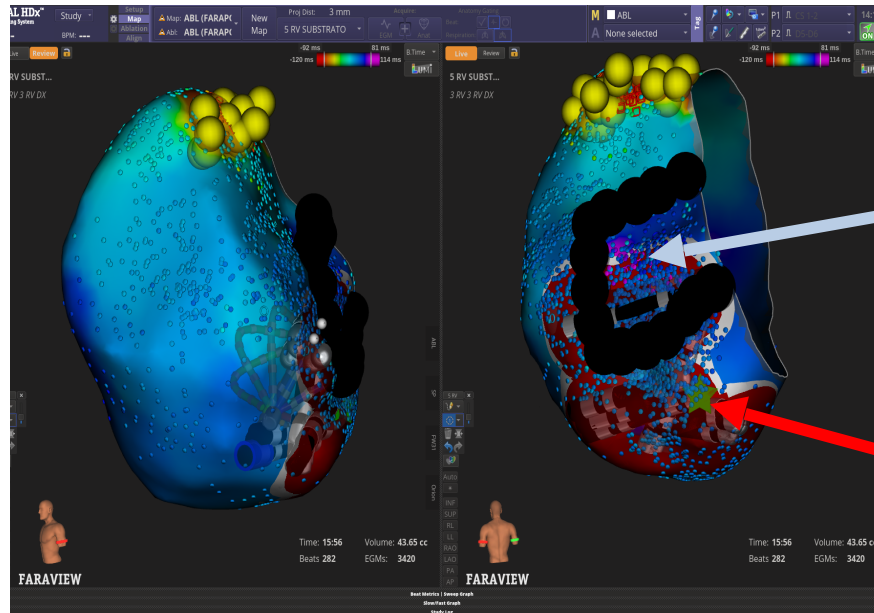
LAVA SINUS



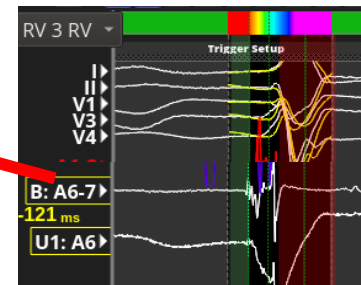
ANTICIPO
PVC

ABLAZIONE FARAPPOINT

DUE SUBSTRATI VENTRICOLARI DA ABLARE



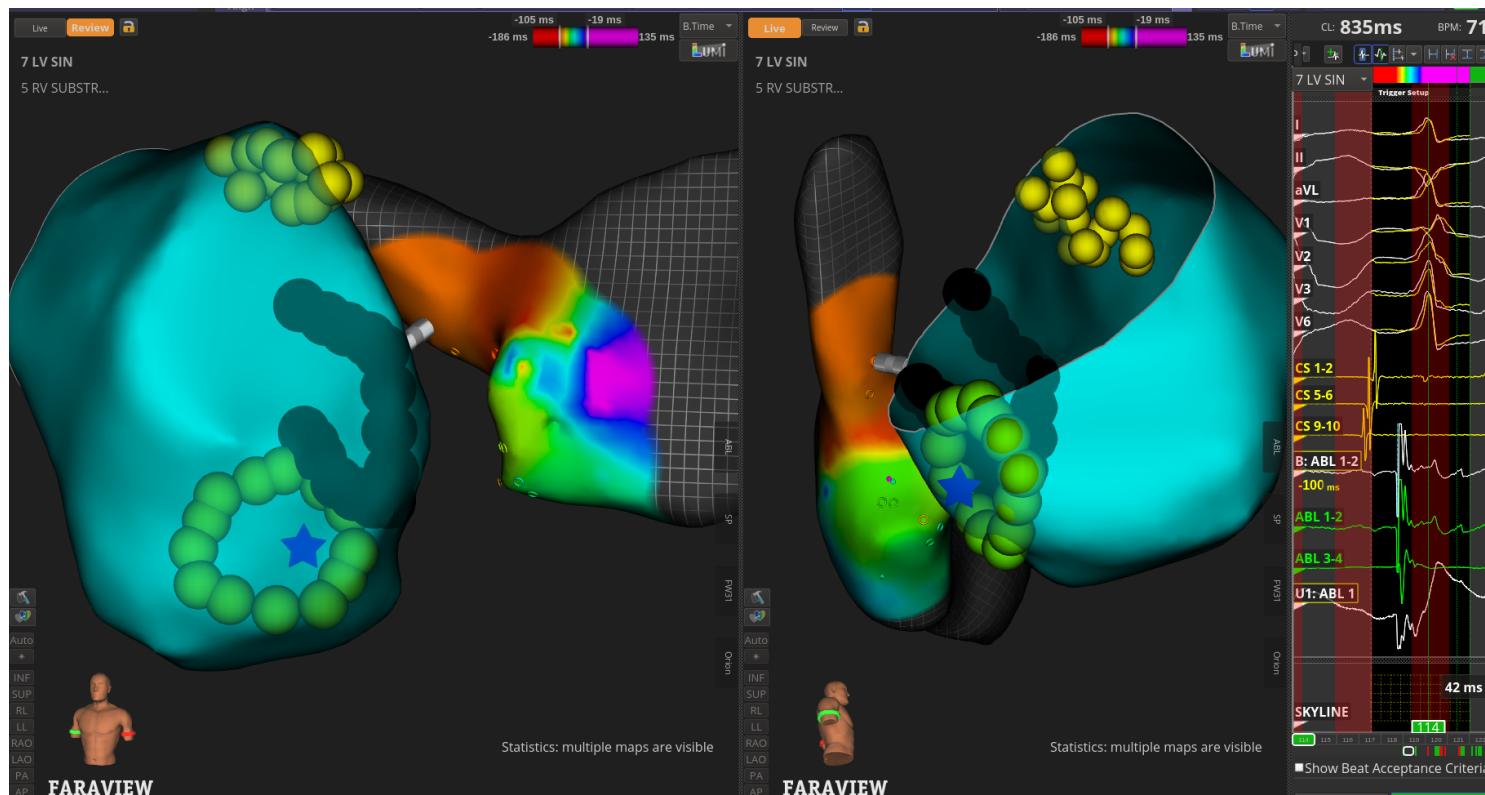
LAVA SINUS



ANTICIPO
PVC

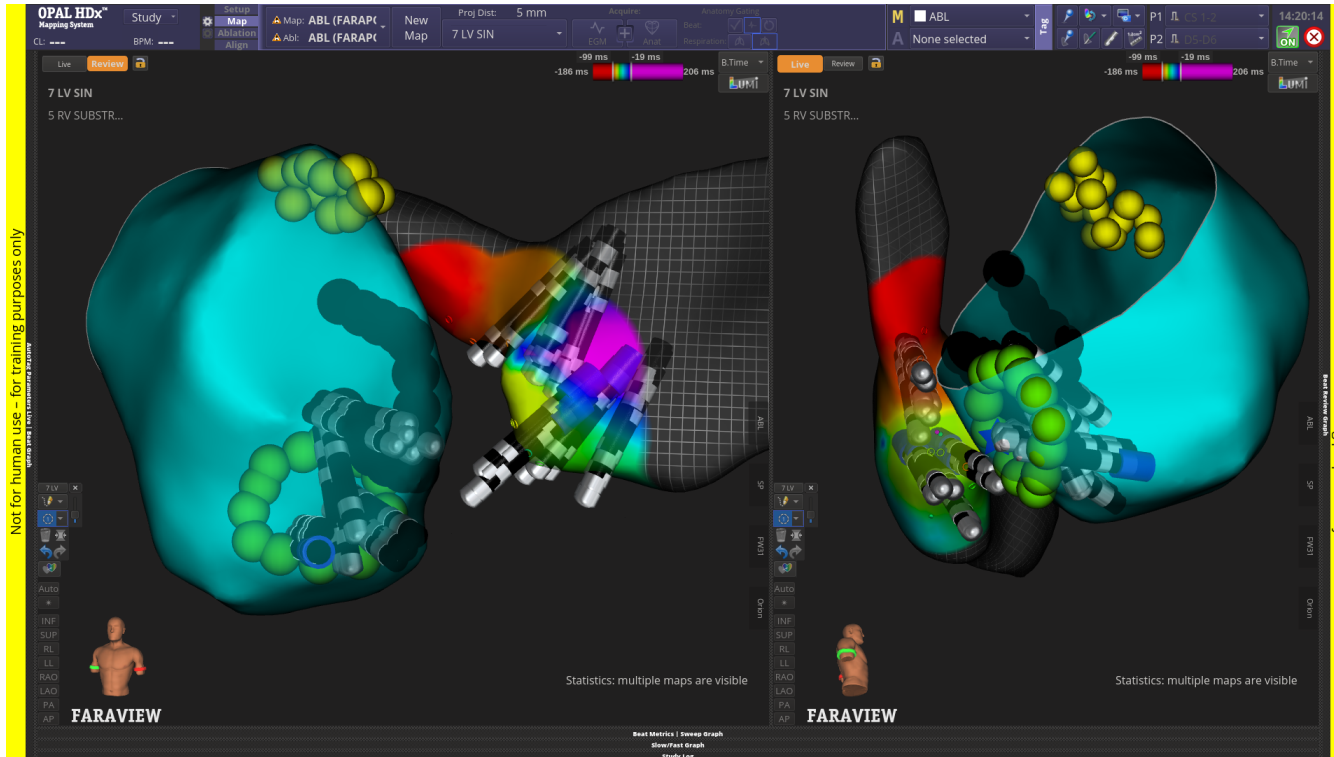
MAPPAGGIO VENTRICOLO SINISTRO

MAPPAGGIO PVC RIMANENTI



ABLAZIONE FARAPPOINT

FINAL LESION SET: 4 COLPI PER SITO



POST ABLAZIONE

RISULTATO FINALE



TEST DI INDUZIONE POST ABLAZIONE E
A 20 MIN DALL'ULTIMA EROGAZIONE
(CON E SENZA ISOPRENALENA):

- REFRATTARIO SINO A 3
EXTRASTIMOLI
- BURST 220 ms NON EFFICACI

Follow up

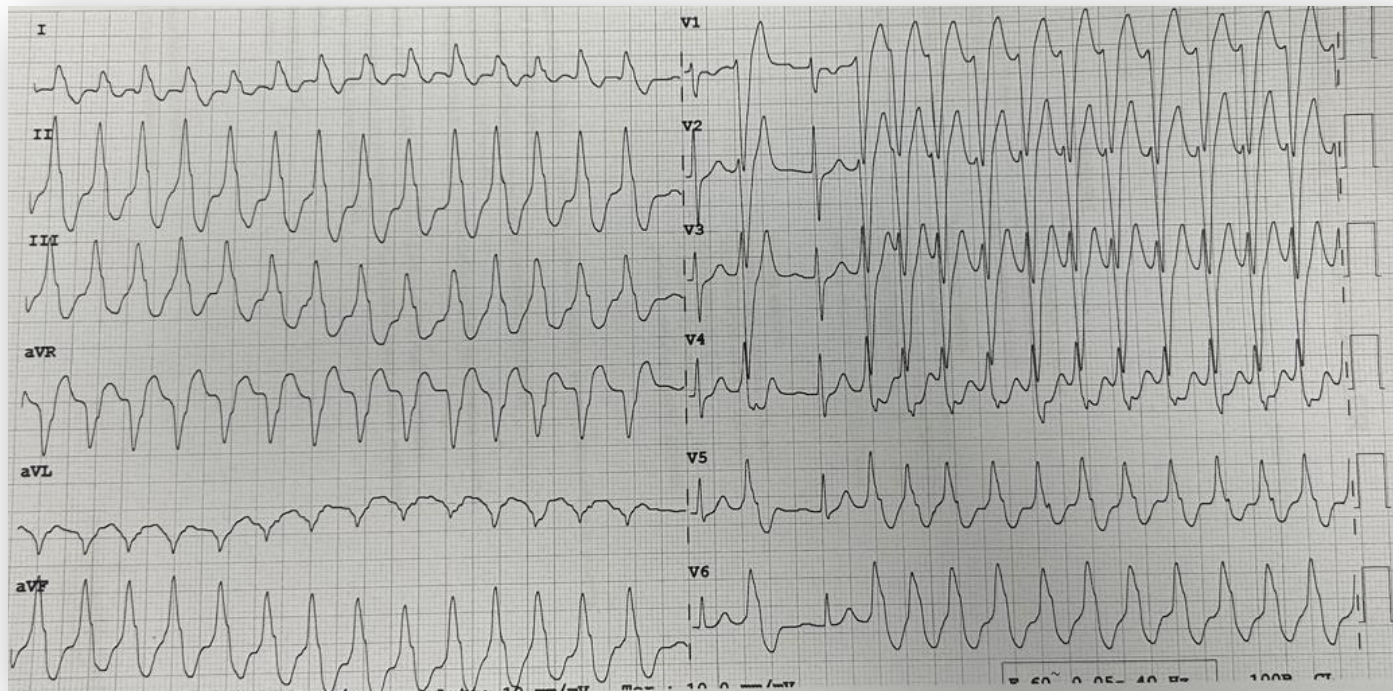
A un mese dall'ablazione al loop recorder ,
burden aritmico di PVC 3% non episodi di TVNS

Con la RF avremmo ottenuto lo stesso risultato??

CASO CLINICO 2

- Male 44 yo
- No significant prior medical history
- Since decembre 2025 palpitation and documented sustained ventricular tachycardia
- ECO: within normal limits
- Coronary CT : within normal limits
- MRI : absence of LGE

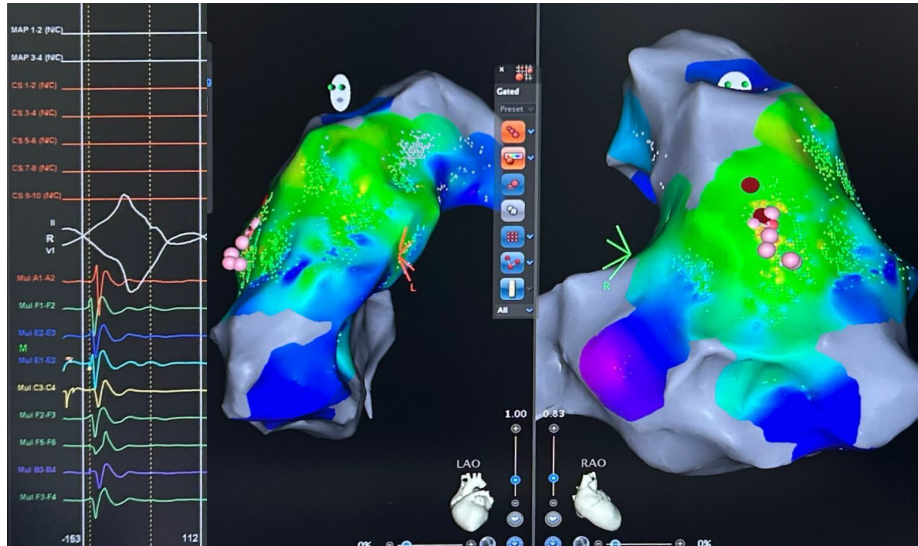
Clinical VT



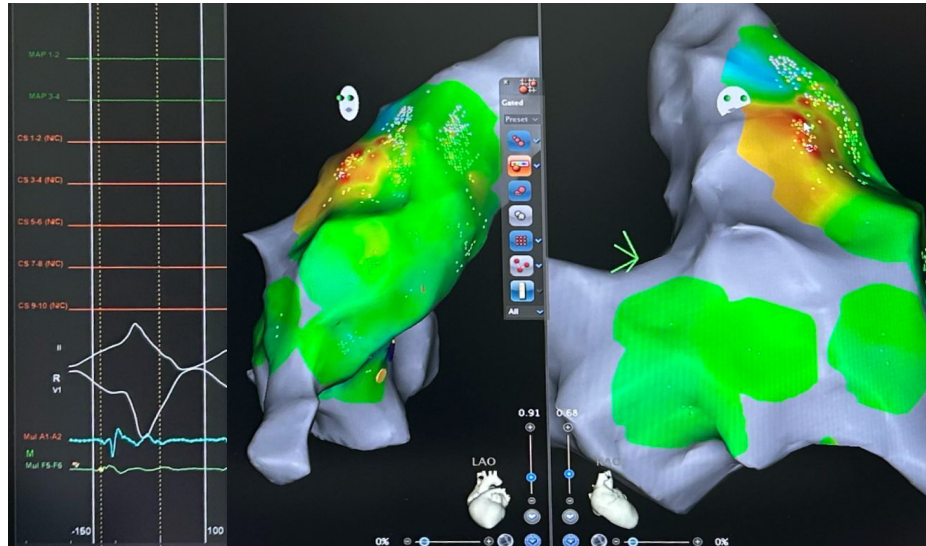
PRECEDENTI ABLAZIONI RF

STESSO SPOT DI ABLAZIONE

1° PROCEDURA



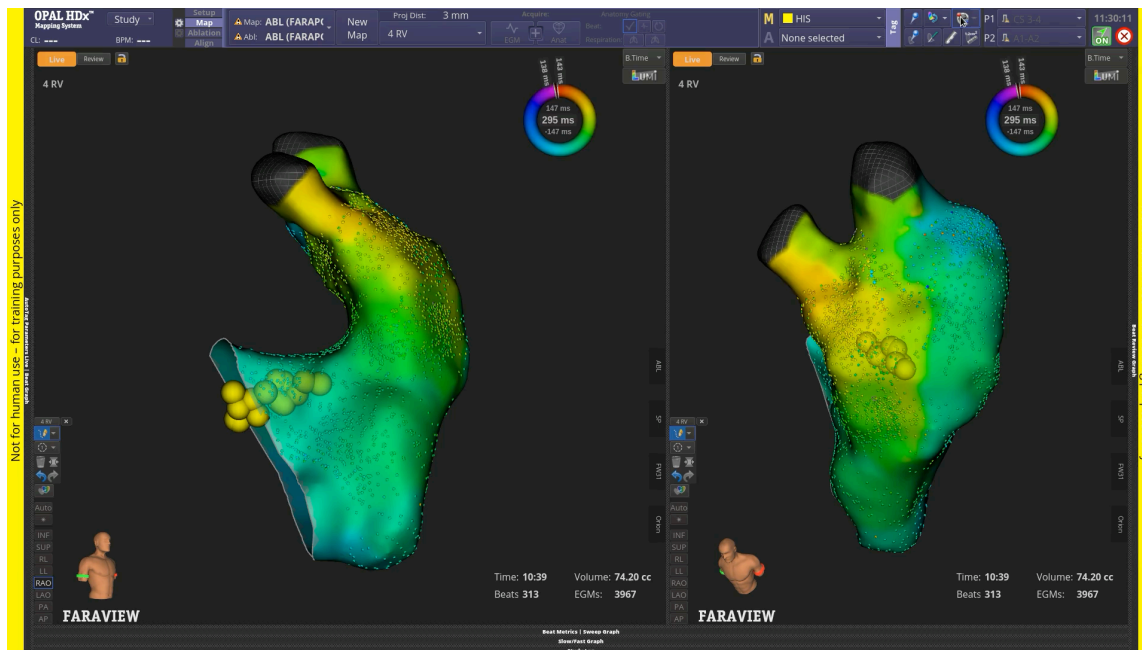
2° PROCEDURA



MAPPAGGIO ORION: VT

STESSO SPOT PRECEDENTI ABLAZIONI

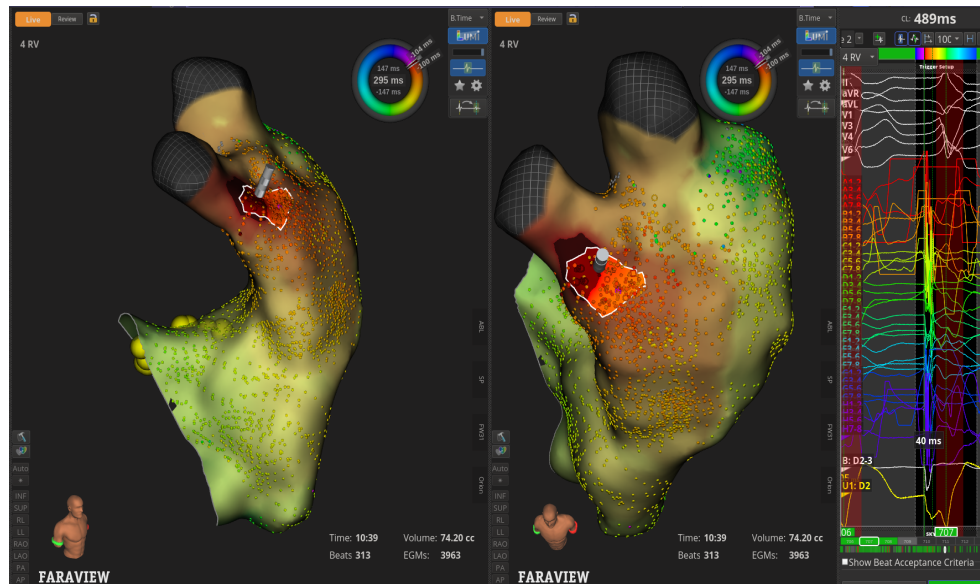
TV INDUCIBILE CON UN SOLO EXTRASTIMOLO



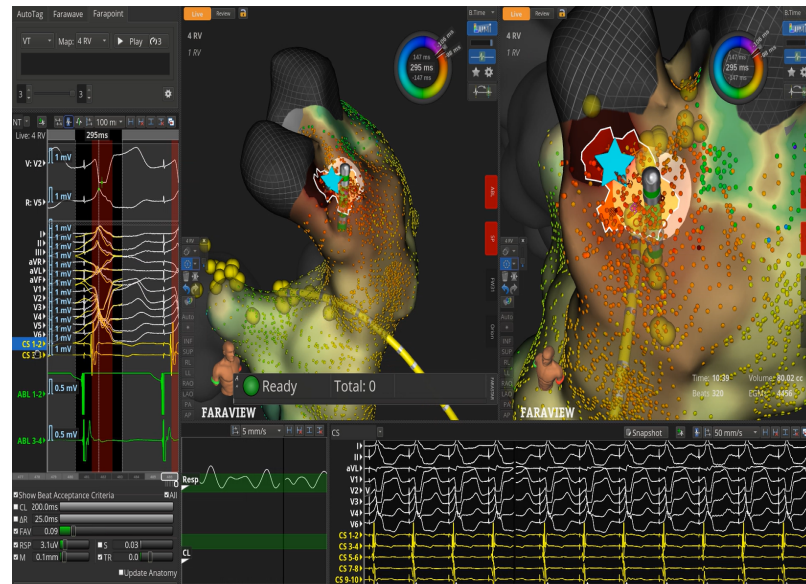
MAPPAGGIO: SEGNALI

MESODIASTOLE VENTRICOLARE & PACE MAPPING

Sito di anticipo in TV

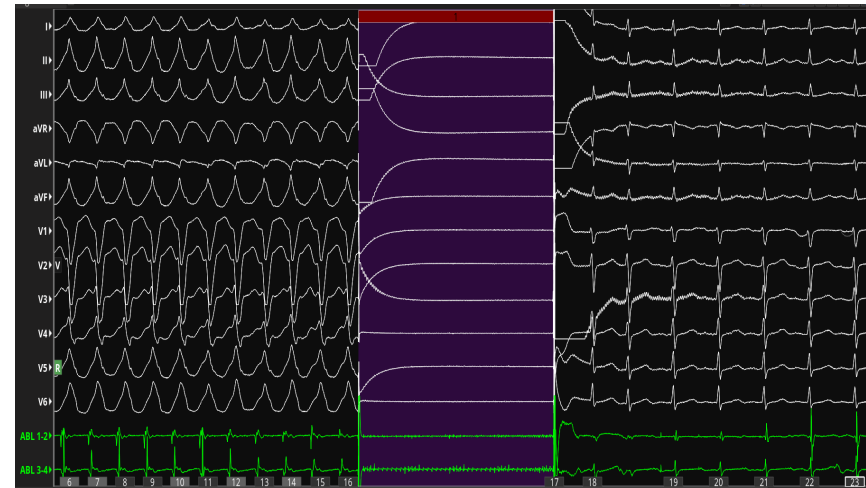


PACE MAPPING: 94% DI
SIMILITUDINE CON VT



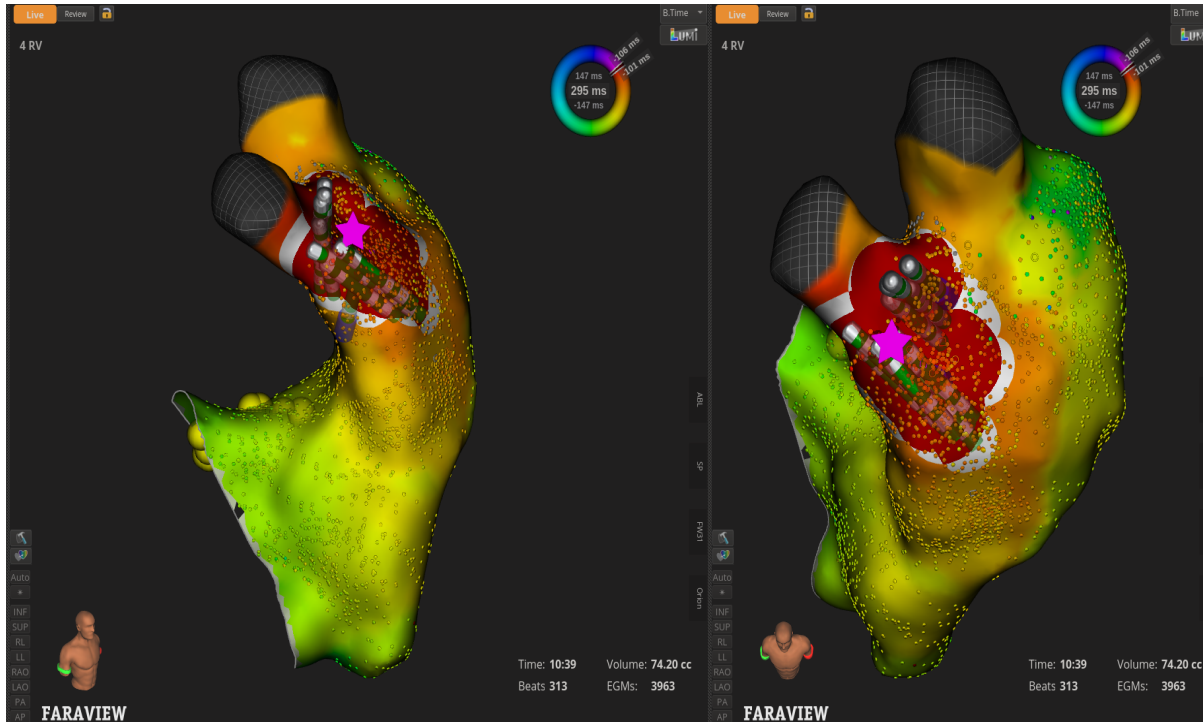
ABLAZIONE VT

INDUZIONE – ABLAZIONE - INTERRUZIONE



RISULTATO ABLAZIONE

FINAL LESION SET: 4 COLPI PER SITO



TEST DI INDUZIONE POST ABLAZIONE E
A 20 MIN E 45 MIN DALL'ULTIMA
EROGAZIONE
(CON E SENZA ISOPRENALINA):

- REFRATTARIO SINO A 4
EXTRASTIMOLI
- BURST 220 ms NON EFFICACI
- ASSENZA DI CATTURA NELLA
REGIONE ABLATA

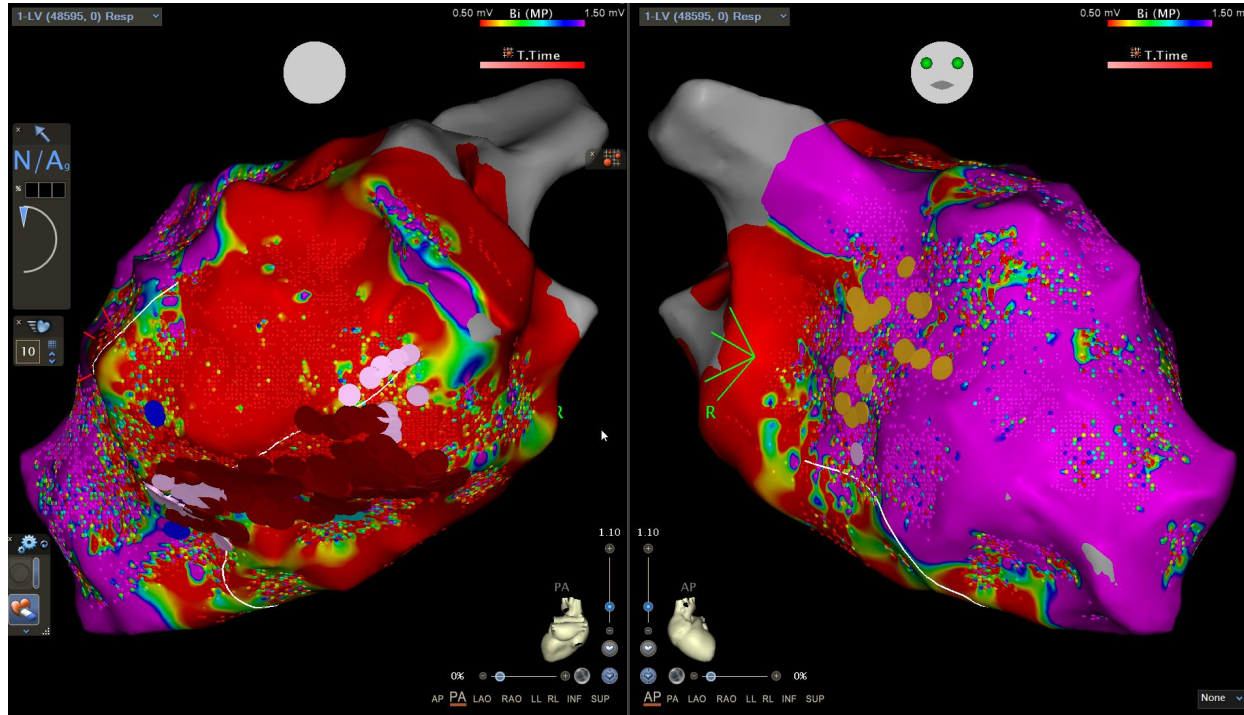
FOLLOW UP

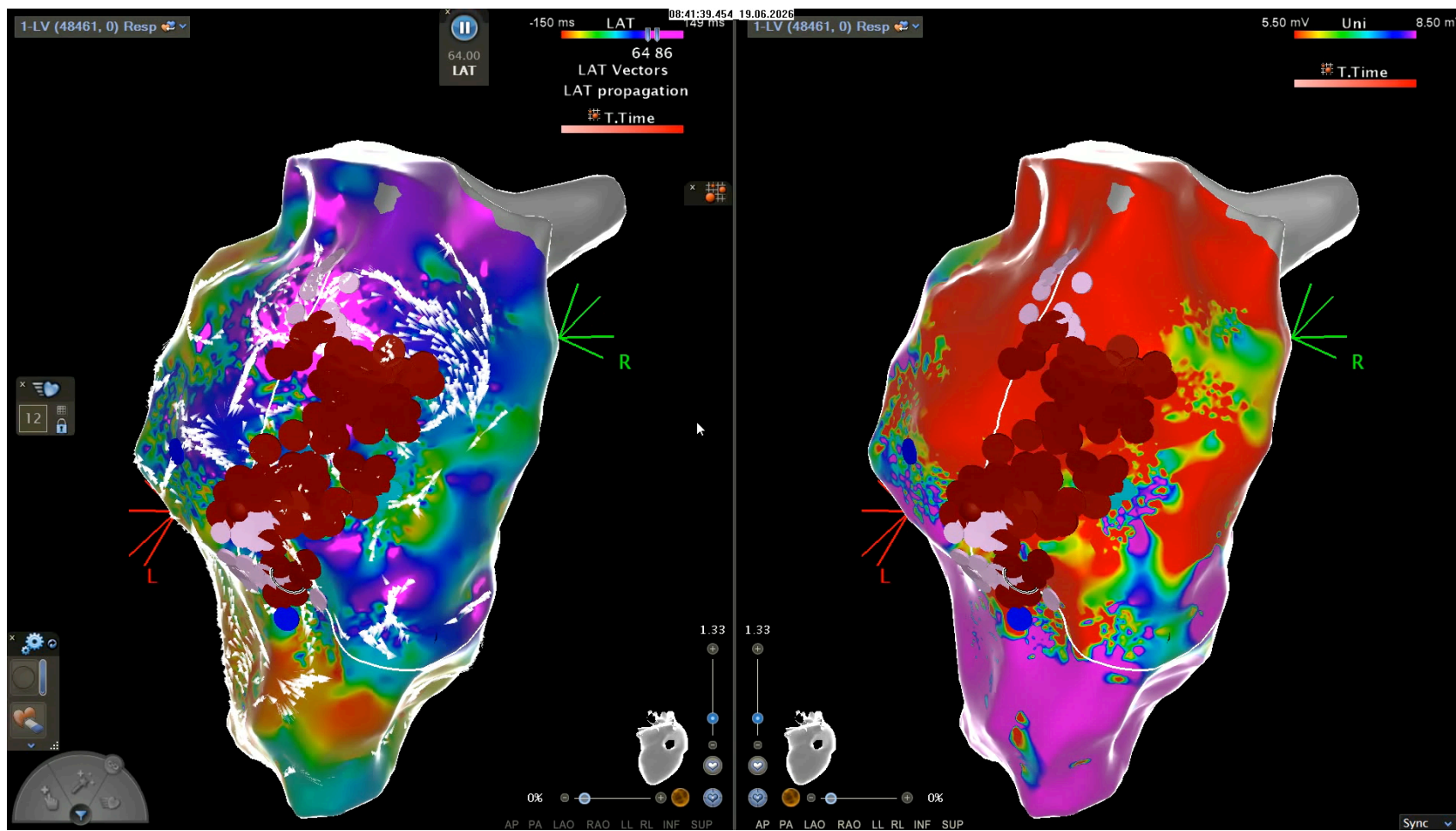
A due mesi dall'ablazione , non più palpitazione ,
Watt test massimale (fino a 180 bpm) senza induzione di aritmie
All'Holter non PVC
Il paziente è portatore di apple watch : nessun episodio registrato

A scene from the TV show Game of Thrones featuring Daenerys Targaryen. She is in the center, wearing a blue cloak and has her long blonde hair braided. She is looking directly at the camera with a serious expression. Behind her is a large formation of Unsullied soldiers, seen from behind, holding long spears and large, dark, circular shields. The background shows a city wall under a clear blue sky.

DRACARYS

VT POST ISCHEMICA



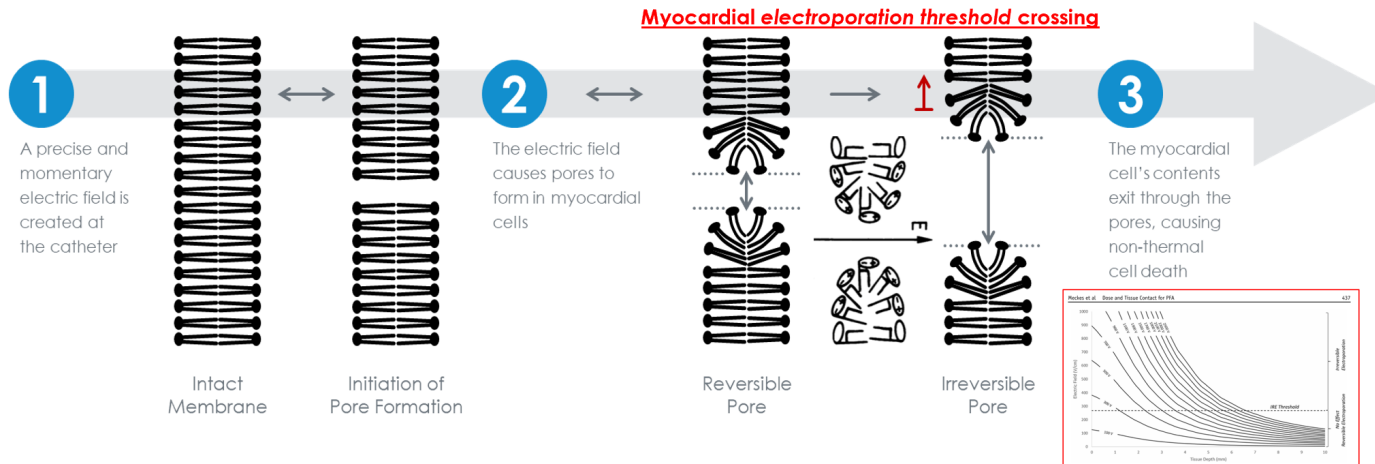


Grazie per l'attenzione !!



Irreversible Electroporation:

cell membrane pore formation & cell death occurs with sufficient electric field



T. Kolnik et al, IEEE Electrical Insulation Magazine, Vol. 28, No. 5 p. 14-23, 2012